Patent claims

1. A method for starting a casting operation in a two-roll casting device without start-up strand, characterized by the following steps:

- setting an operating casting thickness (D) and rotating the casting rolls (1, 2) at a casting-roll circumferential velocity which corresponds to a starting casting velocity (V_{gSt}), which is lower than a steady-state operating casting velocity (V_{gBetr}),
- feeding metal melt (12) into a melt space (11), which is formed by the rotating casting rolls (1, 2) and the side plates (8) bearing against them, and forming a cast metal strip (21) with a substantially constant, predetermined cross-sectional format while at the same time increasing the casting velocity (V_g) to a strip-forming casting velocity (V_{gBb}),
- then increasing the casting velocity (V_g) to a strip-separating casting velocity (V_{gTr}), which is significantly higher than a casting velocity (V_g) which is sufficient for the prevailing full solidification conditions, and separating off the metal strip (21) which has been cast thus far,
- setting a steady-state operating casting velocity (V_{gBetr}),
- diverting the subsequent cast metal strip (21) to a strip-conveying device (24) and commencing steady-state casting operation.

2. The method as claimed in claim 1, characterized in that the starting casting velocity (V_{gSt}) is lower than half the operating casting velocity (V_{gBetr}).

3. The method as claimed in claim 1 or 2, characterized in that the starting casting velocity (V_{gSt}) is less than approximately 12 m/min.

4. The method as claimed in one of claims 1 to 3, characterized in that the starting casting velocity (V_{gst}) is still 0 m/min when metal melt starts to be supplied and is then accelerated.

5. The method as claimed in one of the preceding claims, characterized in that the strip-forming casting velocity (V_{gBb}) is set so as to correspond to a measurable desired mold level (h_{Gsp}).

6. The method as claimed in one of the preceding claims, characterized in that the strip-forming casting velocity (V_{gBb}) substantially corresponds to the steady-state operating casting velocity (V_{gBetr}).

7. The method as claimed in one of the preceding claims, characterized in that the strip-forming casting velocity (V_{gBb}) is regulated as a function of the separating force (F_{Tr}) which occurs between the casting rolls.

8. The method as claimed in one of the preceding claims, characterized in that the strip-separating casting velocity (V_{gTr}) is higher than the strip-forming casting velocity (V_{gBb}) and/or the operating casting velocity (V_{gBetr}).

9. The method as claimed in one of claims 1 to 7, characterized in that the strip-separating casting velocity (V_{gTr}) is 5% to 40% higher than the strip-forming casting velocity (V_{gBb}) and/or the operating casting velocity (V_{gBetr}).

10. The method as claimed in one of the preceding claims, characterized in that a brief increase in the casting thickness (D) by 5 to 40% is superimposed on the increase in the casting velocity to the strip-separating casting velocity (V_{gTr}).

11. The method as claimed in one of the preceding claims, characterized in that the strip-separating casting velocity (V_{gTr}) is set as soon as the metal melt in the melt space (11) has substantially reached the desired operating mold level (h_{Gsp}).

12. The method as claimed in one of the preceding claims, characterized in that the cast metal strip is separated off at the strip-separating casting velocity (V_{gTr}) by the cast strip being torn off under the action of the metal strip's own weight in the casting nip (18) between the casting rolls (1, 2).

13. The method as claimed in one of the preceding claims, characterized in that the cast metal strip is separated off at the strip-separating casting velocity (V_{gTr}) under the action of increased strip tension.

14. The method as claimed in one of the preceding claims, characterized in that the casting velocity (V_g) is increased to approximately the operating casting velocity (V_{gBetr}) at least during a period before the desired operating mold level (h_{gsp}) is reached in the melt space (11).

15. The method as claimed in one of the preceding claims, characterized in that the steady-state casting operation is reached within 5 to 60 sec of the metal melt first being fed into the melt space (11).

16. The method as claimed in one of the preceding claims, characterized in that when starting a casting operation for the production of a very thin metal strip, a starting casting thickness (D_{St}) which is greater than the operating casting thickness (D) is set, and this starting casting thickness is reduced to the operating casting thickness (D) at the earliest after a cast metal strip with a substantially constant, predetermined cross-sectional format has been formed.

17. The method as claimed in one of the preceding claims, characterized in that at least reference data relating to the instantaneous casting velocity (V_g) and the instantaneous mold level of the metal melt and/or the instantaneous separating force (F_{Tr}) between the casting rolls and/or the nip width (G) between the casting rolls and/or the strip thickness of the cast metal strip are determined continuously while casting is starting up and are fed to a calculation unit (36), and on the basis of a mathematical model for the starting operation, these reference data are used to generate control variables for the casting velocity, for the position of a strip-guiding device (22) and for the conveying velocity of the cast metal strip in a strip-conveying device (24) and to transmit these control variables to the drive units (5, 6, 25, 27) of these devices.

18. The method as claimed in claim 15, characterized in that a control variable for the spacing positioning of the casting rolls (1, 2) with respect to one another, in particular a starting casting thickness (D_{St}), is additionally generated from the mathematical model.

19. The method as claimed in claim 15 or 16, characterized in that the mathematical model comprises a metallurgical model relating to the formation of a defined microstructure in the cast metal strip and/or to the influencing of the geometry of the cast metal strip.

20. A two-roll casting device for carrying out the method for starting a casting operation without a start-up strand as claimed in one of the preceding claims 1 to 19, comprising two casting rolls (1, 2), which are coupled to rotary drives (5, 6) and rotate in opposite directions, and side plates (8), which bear

against the casting rolls and together form a melt space (11) for receiving the metal melt (12), as well as at least one displaceable strip-guiding device (22) and at least one strip-conveying device (27), characterized in that

- the casting rolls (1, 2) are assigned a velocity-measuring device (34) for determining the instantaneous casting velocity (V_g);
- the melt space (11) is assigned a level-measuring device (16) for determining the instantaneous mold level (h_{gsp}) of the metal melt,
- and/or one of the casting rolls (1, 2) is assigned a separating-force measuring device (30) for determining the instantaneous separating force (F_{Tr}) between the two casting rolls (1, 2),
- and/or the casting rolls (1, 2) are assigned a position-measuring device (31) for determining the instantaneous nip width (G) between the casting rolls (1, 2),
- and/or a strip thickness-measuring device (32) for determining the instantaneous strip thickness (D) of the metal strip (21) leaving the casting rolls (1, 2) is arranged on the strip exit side of the casting rolls (1, 2),
- the velocity-measuring device (34) and the level-measuring device (16) and/or the separating-force measuring device (30) and/or the position-measuring device (31) and/or the strip thickness-measuring device (32) are connected to a calculation unit (36) by signal lines,
- the calculation unit (36) is connected by signal lines to the rotary drives (5, 6) of the casting rolls (1, 2), to a position-control device (25) of the strip-guiding device (22) and the drive (27) of a strip-conveying device (24).

21. The apparatus as claimed in claim 20, characterized in that at least one of the two casting rolls (1 or 2) is coupled to a casting-roll adjustment

device (7), and the calculation unit (36) is additionally connected by a signal line to the casting-roll adjustment device (7) in order to set a starting casting thickness (D_{St}) which is higher than the operating casting thickness (D).